

STEREO MOC Status Report  
Time Period: 2015:054 - 2015:060

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- On day 055, during the DSS-43 support, turbo decoder lock was lost intermittently between 0630z through 0745z due to heavy rain at the Canberra complex. This anomaly resulted in the loss of five commands, two SECCHI, which were resent on day 056, and three spacecraft bus, not being received and 387 frames of spacecraft SSR playback and real-time data. See DR# C110995 for more information.
- On day 055, during the DSS-14 support, turbo decoder lock was lost intermittently between 2137z through 2345z due to the effects of solar scintillation. The station reported that the downlink signal was varying up to 3 dB. This anomaly resulted in the loss of 10 spacecraft commands not being received, which were resent on day 056, and 849 frames of spacecraft SSR playback and real-time data. See DR# G115991 for more information.
- On day 056, during the DSS-43 support, turbo decoder lock was lost intermittently between 2056z through 2058z due to the effects of solar scintillation. This anomaly resulted in the retransmission of one spacecraft command and 8 frames of spacecraft SSR playback and real-time data.
- On day 058, during the DSS-43 support, turbo decoder lock was lost intermittently between 0621z through 0737z due to the effects of solar scintillation. This anomaly resulted in the loss of 39 frames of spacecraft SSR playback and real-time data.
- On day 058, during the DSS-14 support, turbo decoder lock was lost intermittently between 2127z through 059-0014z due to the effects of solar scintillation. This anomaly resulted in the loss of 42 frames of spacecraft SSR playback and real-time data.
- On day 059, during the DSS-63 support, turbo decoder lock was lost intermittently between 1446z through 1636z due to

the effects of solar scintillation. This anomaly resulted in the loss of 185 frames of spacecraft SSR playback and real-time data.

- On day 060, during the DSS-63 support, turbo decoder lock was lost intermittently between 1443z through 1626z due to the effects of solar scintillation. This anomaly resulted in the loss of 23 frames of spacecraft SSR playback and real-time data.
2. The following spacecraft/instrument events occurred during this week. Note that the Ahead observatory is operating on the second side lobe of the HGA to prevent overheating of the HGA feed assembly which is currently at 111 degrees C with the HGA angle at 8.7 degrees, with respect to the spacecraft-Sun line.
- The average daily science data return for Ahead, while operating on the second side lobe on the HGA, was 13 Mbits during this week.

STEREO Behind (STB) Status:

1. The following Ground System anomalies/events occurred during this reporting period:
- None.
2. Detailed status of the activities that occurred on the Behind loss of communication anomaly, which occurred on day 2014-274, are listed below.
- The Behind observatory entered superior solar conjunction at the two degree SPE angle on day 022. Recovery efforts will resume post solar conjunction on day 082 with increasing the ground transmit power through arraying uplink stations and implementing the Failure Review Board recommendations.

Significant findings to date:

1. Analysis of the three DSN extracted telemetry frames from the carrier signal just before the planned observatory reset/anomaly occurred on day 2014-274, October 1<sup>st</sup>, showed nominal performance of the spacecraft, i.e., no anomalies,

IMU off, and the star tracker providing an attitude solution.

2. Post reset, from the very limited telemetry, three packets, extracted from the carrier signal by the DSN, the X-axis gyro on IMU-A had failed. Unfortunately, this telemetry contained only G&C anomaly data and no spacecraft summary data, i.e., the state of the RF, G&C, fault protection and other subsystems is not known at the time of the anomaly. With a failed IMU and the star tracker being off-line for an undetermined duration, the sun sensors will keep the observatory pointed at the Sun, though the G&C will not have any roll knowledge, and cannot roll the observatory as part of the safing configuration to re-establish communications on the LGAs. From analysis of this telemetry and initial G&C simulations, it is highly suspected that the observatory is rotating about the principal axis of inertia due to an autonomous momentum dump initiated by biased gyro data flagged good by the IMU, but this has not yet been confirmed.
3. At least two anomalies occurred post reset, the star tracker not promoting to AAD mode and the X-axis gyro failure. Unfortunately, due to the number of possible combinations, the STEREO fault protection system is not designed for simultaneous failures.

The cause and effect analysis of the loss of communications from the LGAs is continuing. G&C simulations using the biased gyro data flagged good by the IMU are continuing to better understand the potential impact to the observatory state. Recovery from a negative power state is also being investigated. While the recovery and analysis efforts continue on Behind, as the Ahead observatory will enter superior solar conjunction in March, the primary focus of the engineering team is on developing operational configuration changes to add robustness to the G&C rate sensor usage to ensure the Ahead observatory's continued safety.

Once communications are restored and the anomaly resolved, the Behind observatory will be returned to nominal science data collection as soon as it is safely possible.